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1   LISTING OF THE CLAIMS

2   **CLAIMS**

3   What is claimed is:

4   1.   (previously presented) A method for imparting a watermark onto a digitized image, said

5   method comprising:

6   providing a digitized image having at least one image plane, said image plane being

7   represented by an image array having a plurality of pixels, each pixel in said plurality of pixels

8   having at least one color component, said watermark being formed using a distinct watermarking

9   plane represented by an array having a plurality of distinct watermarking elements, each of said

10   distinct watermarking elements having an array position and having one-to-one positional

11   correspondence with said image pixels, and

12   multiplying brightness data associated with said at least one color component by a

13   predetermined brightness multiplying factor, wherein said brightness multiplying factor is a

14   corresponding distinct watermarking element, and said watermark has a invisibility

15   classification, wherein said brightness multiplying factor has a relationship with a number taken

16   from a random number sequence.

17   2.   (canceled)

18   3.   (previously presented) A method as recited in claim 1, wherein said relationship is a

19   linear remapping to provide a desired modulation strength.

20   4.   (Original) A method as recited in claim 3, wherein said modulation strength lies in the

21   domain greater than or equal to zero and less than or equal to 0.5.

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1   5.   (previously presented) A method for imparting a watermark onto a digitized image
2   comprising the steps of:

3   providing said digitized image comprised of a plurality of pixels, wherein each of said
4   pixels includes brightness data that represents a brightness of at least one color; and

5   altering said brightness data associated with a plurality of said pixels maintaining the hue
6   and saturation of said pixel,

7   wherein said image has I rows and J columns, and has a pixel in row i and column j having at
8   least one brightness, $Y(i,j)$, and the step of altering includes: adding to or subtracting from the
9   brightness $Y(i,j)$ a different small random value $e(i,j)$, wherein $1 < i < I$ and $1 < j < J$ are the row
10   and column indices of a pixel location in the image, and

11   wherein color components of the unaltered pixel are $X(i,j)$, $Y(i,j)$, and $Z(i,j)$, and color
12   components of the brightness altered pixel are $X'(i,j)$, $Y'(i,j)$, and $Z'(i,j)$, and the step of adding
13   to or subtracting from includes setting $e(i,j) = d(i,j)Y(i,j)$, where $d(i,j)$ is a value selected from an
14   array of random values within a range of $0 <= d(i,j) <= 1$, such that the modified brightness
15   $Y'(i,j) = Y(i,j)+e(i,j) = Y(i,j)+d(i,j)Y(i,j)$, and $X'(i,j)/X(i,j) = Z'(i,j)/Z(i,j) = Y'(i,j)/Y(i,j) = e(i,j)$
16   $= 1-d(i,j)$.

17   6.   (Canceled)

18   7.   (Previously presented) A method as recited in claim 5, wherein the step of adding to or
19   subtracting from includes making $e(i,j)$ proportional to an original brightness of the pixel.

20   8.   (Canceled)

21   9.   (previously presented) A method as recited in claim 5, wherein the step of setting
22   includes preserving ratios of color components in each pixel.

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1   10.   (Original) A method as recited in claim 9, wherein the step of preserving includes setting

2    $X'(i,j)/X(i,j) = Z'(i,j)/Z(i,j) = Y'(i,j)/Y(i,j) = 1-d(i,j)$, wherein the color components of the

3   unaltered pixel are $X(i,j)$, $Y(i,j)$, and $Z(i,j)$, and the color components of the brightness altered

4   pixel are $X'(i,j)$, $Y'(i,j)$, and $Z'(i,j)$.

5   11. (canceled)

6   12. (previously presented) A method for imparting a watermark onto a digitized image

7   comprising the steps of:

8   providing said digitized image comprised of a plurality of pixels, wherein each of said

9   pixels includes brightness data that represents a brightness of at least one color, with said

10   image having I rows and J columns, and a pixel in row i and column j having a brightness

11        $Y(i,j)$; and

12   for a plurality i and at least one j adding to or subtracting from the brightness $Y(i,j)$ a

13   random value $e(i,j)$, wherein $1 [i [I$ and $1 [j [J$ are the row and column indices of a pixel

14   location in the image,

15   wherein $e(i,j)$ is in the domain 0 to 1 multiplied by $Y(i,j)$.

16   13. (canceled)

17   14. (canceled).

18   15. (previously presented) A method for detecting a watermark in a marked image, said method

19   comprising:

20   providing said marked image marked by a watermarking plane, said marked image having at

21   least one color plane including a plurality of image pixels, said watermarking plane having a

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1   plurality of watermarking elements, wherein each of said image pixels has at least one brightness

2   value and each of said watermarking elements has a brightness adding and/or subtracting factor,

3   including the steps of:

4   (a) reconstructing said watermarking plane;

5   (b) aligning said watermarking plane with said marked image such that each

6   watermarking element has a corresponding image pixel;

7   (c) providing a selector array and a visualizer image of equal size, wherein said selector

8   array has a plurality of selector elements each having at least one counter, and wherein said

9   visualizer image has a plurality of visualizer pixels each having at least one brightness value, and

10   wherein said visualizer pixels represent a recognizable pattern when displayed;

11   (d) resetting said at least one counter to zero;

12   (e) placing said selector in an initial position by aligning said selector elements with a

13   plurality of corresponding image pixels and a plurality of corresponding watermarking elements;

14   (f) choosing a selector element and identifying a corresponding watermarking element;

15   (g) identifying a first plurality of watermarking elements that neighbor said corresponding

16   watermarking element;

17   (h) generating a first average that represents an average of brightness ~~multiplying~~ adding

18   and/or subtracting factors of said first plurality of watermarking elements;

19   (i) choosing a color plane of said marked image and finding a corresponding image pixel;

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1   (j) identifying a first plurality of neighboring pixels that neighbor said corresponding

2   image pixel;

3

4   (k) generating a second average that represents an average of brightness values of said

5   first plurality of neighboring pixels;

6   (l) updating said at least one counter based upon first and second comparison operations,

7   wherein said first comparison operation compares said first average with said brightness adding

8   and/or subtracting factor of said corresponding watermarking element and said second

9   comparison operation compares said second average with said brightness value of said

10   corresponding pixel;

11   (m) repeating steps (i) through (l) for all color planes;

12   (n) repeating steps (f) through (m) for all selector elements;

13   (o) choosing a new selector position that does not overlap any previous selector position;

14   (p) repeating steps (f) through (o) for all non-overlapping selector positions; and

15   (q) generating a visual representation indicating detection of said watermark in said

16   marked image utilizing said at least one counter of said selector array and said visualizer pixels,

17   wherein the step of aligning said watermarking plane with said marked image includes altering

18   said marked image employing a blurring filter.

19   16.   (Original) A method for detecting a watermarking plane comprising the steps of:

20   providing an image having a plurality of image pixels, $u(i,j)$, with said image having I

21   rows and J columns, and a pixel in row i and column j having at least one component, marked by

22   a watermarking plane; said watermarking plane having a plurality of watermarking elements,

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1     $w(i,j)$, with said watermarking plane having I rows and J columns, and an element in row i and

2   column j having a brightness multiplying factor;

3   aligning said watermarking plane with said image;

4   identifying a subset of said image elements;

5   for each pixel, $u(i,j)$, of said subset of image pixels,

6   generating a first value representing a relationship between an attribute of said

7   pixel $u(i,j)$ and an attribute of image pixels that neighbor said pixel $u(i,j)$;

8   1   identifying a watermarking element, $w(i,j)$, that corresponds to said pixel $u(i,j)$

9   and watermarking elements that correspond to said image pixels that neighbor said image pixel

10    $u(i,j)$;

11   generating a second value representing a relationship between an attribute of said

12   watermarking element $w(i,j)$ and an attribute of the identified watermarking elements; and

13   generating a coincidence value representing a likelihood that said image is marked

14   by said watermarking plane based upon said first and second values.

15   17.   (Original) A method as recited in claim 1, wherein said distinct watermarking element,

16   has a value being in the domain greater than or equal to zero and less than or equal to one.

17   18. (Original) A method for imparting a watermark onto a digitized image comprising the steps

18   of:

19   providing said digitized image comprised of a plurality of image pixels with said

20   digitized image having I rows and J columns, and a pixel in row i and column j having at least

21   one component, $Y(i,j)$; and

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1   adding to or subtracting from said brightness data associated with at least one of said

2   pixels a predetermined brightness adding factor in the range of 0 to $Y(i,j)$, or brightness

3   subtracting factor in the range of 0 to $Y(i,j)$.

4   wherein said brightness adding or subtracting factor has a relationship with a number taken from

5   a random number sequence, said relationship is a linear remapping to provide a desired

6   modulation strength, and said modulation strength is less than or equal to 50 percent.

7   19. (Original) A method for imparting a watermark onto a digitized image comprising the steps

8   of:

9   providing said digitized image comprised of a plurality of image pixels with said image

10   having I rows and J columns, and a pixel in row i and column j having at least one component,

11   $Y(i,j)$; and

12   adding to or subtracting from said brightness data associated with at least one of said

13   pixels by a predetermined brightness adding or subtracting factor in the range of 0 to $Y(i,j)$, .

14   wherein said brightness adding or subtracting factor has a relationship with a number taken from

15   a random number sequence, said relationship is a linear remapping to provide a desired

16   modulation strength, said sequence is formed from a plurality of robust watermarking

17   parameters, and said parameters comprise a cryptographic key, two coefficients and an initial

18   value of said random number generator.

19   20.   (Original) A method for detecting a watermark, said method comprising:

20   providing a marked image having a plurality of image pixels said marked image being marked by

21   a watermarking plane, having a plurality of watermark elements;

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1   aligning said watermarking plane with said marked image, and

2   generating a coincidence value by averaging a detection coincidence for each selector element of

3   a group of selector elements taken from said image pixels.

4

5   21.   (Original) A method as recited in claim 20, wherein each of said group of selector

6   elements has a selector size, said method further comprising:

7   providing a visualizer pattern having a plurality of visualizer pixels and a visualizer size equal to

8   said selector size, each of said visualizer pixels being associated with one of said selector

9   elements and having a visualizer color; and

10   displaying a watermark detection pattern having a size at least equal to said visualizer size and a

11   plurality of visualizer-coincidence pixels, wherein each of said visualizer-coincidence pixels is

12   associated with a corresponding selector element and a corresponding visualizer pixel, and each

13   of said visualizer-coincidence pixels being displayed having said visualizer color when said

14   coincidence value of said corresponding selected element has an indication of a detection success

15   and having another color otherwise.

16   22.   (Original) A method as recited in claim 20 wherein said watermark is based on a factor

17   multiplying a brightness value of each of said image pixels.

18   23.   (Original) A method as recited in claim 20, further comprising:

19   reconstructing said watermarking plane used in generating said watermark.

20

21   24.   (Original) A method as recited in claim 23, wherein said watermarking plane has a

22   plurality of watermarking elements, said method further comprising:

23   rotating, resizing and said image to bring it to a size and position of an original image, and

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1   aligning said watermarking plane with said marked image such that each of said watermarking

2   elements has a corresponding image pixel.

3   25.   (Original) A method as recited in claim 20, wherein each said group contains 128

4   elements.

5   26.   (Original) A method as recited in claim 20, wherein each pixel of said image pixels has a

6   monochrome brightness value.

7   27.   (Original) A method as recited in claim 20, wherein said watermarking plane is

8   generated using a plurality of robust watermarking parameters.

9   28.   (Previously presented) A method as recited in claim 20, wherein said coincidence value

10   is determined using a statistically related attribute relating each said selector element to a

11   plurality of neighboring elements.

12   29.   (Original) A method as recited in claim 28, wherein said attribute is a brightness value.

13

14   30.   (Original) A method for detecting a watermark imparted on an image, said method

15   comprising:

16   providing said image having at least one image plane, said image plane being represented by an

17   image array having a plurality of image elements, said watermark being formed using a

18   watermarking plane represented by a watermarking array having a plurality of watermarking

19   elements, each of said watermarking elements having a first array position and having one-to-one

20   positional correspondence with said image elements;

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1   computing a first statistically related variable for each element of at least one first grouping of a

2   first selector array of elements taken from said image elements, wherein each of said image

3   elements has a second array position;

4   computing a second statistically related variable for each element of at least one second grouping

5   of a second selector array of elements taken from said watermarking elements, wherein each

6   element of said second selector array of elements has one-to-one positional correspondence with

7   said first selector array, and wherein said correspondence forms combinations of corresponding

8   elements;

9   comparing to determine an affirmative and non-affirmative likeness of said first and second

10   statistically related variables for each of said combinations of corresponding elements; and

11   forming at least one comparison array having one-to-one correspondence with said at least one

12   first grouping and having a plurality of comparison elements, wherein each of said comparison

13   elements contains a positive detection indication for each element of said first grouping when

14   said step of comparing results in an affirmative likeness, and a negative detection indication for

15   each element of said first grouping when said step of comparing results in a non-affirmative

16   likeness.

17   31.   (Original) A method as recited in claim 30, wherein said watermark is formed by adding

18   or subtracting a brightness factor of each of said image elements by an amount contained in a

19   corresponding element of said watermarking elements.

20   32.   (Original) A method as recited in claim 30, wherein said first grouping corresponds to a

21   selector positioned to encompass said first selector array of elements forming a rectangular

22   cluster of elements.

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1   33.   (Original) A method as recited in claim 30, wherein said first statistical variable is

2   formed by comparing an attribute of said each element of said first selector array of elements to

3   an average attribute of its 128 closest neighbors.

4   34.   (Previously presented) A method as recited in claim 33 , wherein said attribute is a ratio

5   of the color component to the average of neighboring color components in the same color plane.

6   35.   (Original) A method as recited in claim 30, wherein each of said at least one first

7   grouping is positioned so as not to overlap any other of said at least one first grouping.

8

9   36.   (Original) A method as recited in claim 30, wherein each said comparison elements has a

10   particular position in said comparison array, said method further comprising:

11   determining an average percentage of said affirmative and non-affirmative likeness of each

12   element of said comparison elements having a same particular position in all arrays of said at

13   least one comparison array, and

14   forming a detection array of elements having one-to-one element correspondence with said

15   comparison elements, wherein each element of said detection array of elements contains said

16   average percentage.

17   37.   (Original) A method as recited in claim 36, further comprising the steps of:

18   providing a visualizer pattern of pixels represented by an array having visualizer pixels which

19   have one-to-one element correspondence with said detection array, each of said visualizer pixels

20   has a first logical value if a corresponding visualizer pixel is black, and a complementary logical

21   value if said corresponding pixel is white;

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1   forming a visualizer coincidence image having a plurality of coincidence pixels, wherein a

2   coincidence pixel has a corresponding visualizer pixel and a corresponding detection array

3   element; and

4   setting said coincidence pixel to black if both said corresponding visualizer pixel is black and

5   said percentage average of said corresponding detection array element has a value greater than a

6   predetermined detection threshold, otherwise setting said coincidence pixel to white.

7   38.   (Original) A method as recited in claim 30, wherein said image has three color planes.

8   39.   (Original) A method comprising generating a visual representation of a data array of data

9   elements having a data array size, including the steps of:

10   providing a visualizer pattern of visualizer pixels represented by a visualizer array of

11   visualizer pixels, said visualizer array having a visualizer array size equal to said data array size;

12   forming a visualizer-coincidence image of image pixels represented by an image array

13   having an image array size equal to said visualizer array size;

14   setting each said visualizer-coincidence pixel to the color of said corresponding visualizer

15   pixel if a value of said corresponding data element is above a predetermined threshold and to

16   another color if said value is below said predetermined threshold; and

17   displaying said visualizer-coincidence image to form said visual representation.

18   40. (Original) A method as recited in claim 39, wherein said data array represents data resulting

19   from a watermark detection implementation.

20   41. (Original) A method as recited in claim 39, wherein said first color is black and said second

21   color is white.

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1   42. (Original) A method as recited in claim 39, wherein said threshold is set at a fifty percent

2   success rate.

3   43. (Original) A method for demonstrating an existence of a watermark in a marked image, said

4   image having a plurality of image pixels, said method comprising:

5   providing a visualizer pattern represented by an array of visualizer elements, each of said

6   visualizer elements corresponding with one pixel of a plurality of visualizer pixels and having a

7   first value if said one pixel has a first color and a second value if said one pixel has a second

8   color, said visualizer array having a visualizer array size;

9   implementing a watermark detection scheme and computing a coincidence value for each of said

10   image pixels within a plurality of pixel selector arrays taken from among said image pixels, each

11   of said pixel selector arrays having a selector array size equal to said visualizer array size;

12

13   forming a detection array from a plurality of coincidence values, wherein said detection array has

14   a detection array size equal to said visualizer size; and

15   computing a coincidence detection value for each of said visualizer elements such that said

16   detection value represents a visualizer.

17   44. (Original) A method for detecting a watermark in a marked image having a plurality of image

18   pixels, said marked image marked by a watermarking plane having a plurality of watermarking

19   elements, said method comprising:

20   providing a visualizer pattern having a plurality of visualizer pixels and a visualizer size;

21   aligning said watermarking plane with said marked image such that each said image pixel has a

22   corresponding watermarking element;

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1 generating a statistically related variable for each image element in a plurality of groupings of

2 image elements in relationship with said corresponding watermarking element; wherein each of

3 said groupings has a grouping size equal to said visualizer size;

4 averaging said variable for each element in a like position of all of said groupings to obtain a

5 composite detection success value; and

6 displaying detection success values by a plurality of visualizer-coincidence pixels having a size

7 equal to said visualizer size, each said visualizer-coincidence pixel having a same color as said

8 corresponding visualizer pixel when said corresponding success value indicates detection success

9 and another color otherwise.

10 45. (previously presented) A computer program product comprising a computer usable medium

11 having computer readable program code means embodied therein for causing a watermark to be

12 imparted into an image, the computer readable program code means in said computer program

13 product comprising computer readable program code means for causing a computer to effect the

14 steps of:

15   providing a digitized image having at least one image plane, said image plane being

16   represented by an image array having a plurality of pixels, each of said pixel pixels

17   having at least one color component, said watermark being formed using a distinct

18   watermarking plane represented by an array having a plurality of distinct watermarking

19   elements, each of said distinct watermarking elements having an array position and

20   having one-to-one positional correspondence with said image pixels, and

21   multiplying said brightness data associated with said at least one color component by a

22   predetermined brightness multiplying factor, wherein said brightness multiplying factor is

23   a corresponding distinct watermarking element, and said watermark has a invisibility

24   classification, wherein said distinct watermarking element, has a value being in the

25   domain greater than or equal to zero and less than or equal to one.

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1   46. (canceled)

2   47. (canceled)

3   48. (canceled)

4   49. (canceled)

5   50. (canceled)

6   51. (Original) An article of manufacture comprising a computer usable medium having computer

7   readable program code means embodied therein for causing detection of a watermark in a marked

8   image, the computer readable program code means in said article of manufacture comprising

9   computer readable program code means for causing a computer to effect the steps of claim 16.

10   52. (Original) An article of manufacture comprising a computer usable medium having computer

11   readable program code means embodied therein for causing generation of a visual representation

12   of a data array of data elements, the computer readable program code means in said article of

13   manufacture comprising computer readable program code means for causing a computer to effect

14   the steps of claim 39.

15   53. (Original) An article of manufacture comprising a computer usable medium having computer

16   readable program code means embodied therein for causing a watermark to be imparted onto a

17   digitized image, the computer readable program code means in said article of manufacture

18   comprising computer readable program code means for causing a computer to effect the steps of

19   claim 18.

20   54. (Original) An article of manufacture comprising a computer usable medium having computer

21   readable program code means embodied therein for causing a watermark to be imparted onto a

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1   digitized image, the computer readable program code means in said article of manufacture

2   comprising computer readable program code means for causing a computer to effect the steps of

3   claim 19.

4   55. (Original) An article of manufacture comprising a computer usable medium having computer

5   readable program code means embodied therein for causing detection of a watermark imparted

6   onto a digitized image, the computer readable program code means in said article of manufacture

7   comprising computer readable program code means for causing a computer to effect the steps of

8   claim 20.

9   56. (Original) An article of manufacture comprising a computer usable medium having computer

10   readable program code means embodied therein for causing detection of a watermark in a marked

11   image, the computer readable program code means in said article of manufacture comprising

12   computer readable program code means for causing a computer to effect the steps of claim 30.

13   57. (currently amended) An article of manufacture comprising a computer usable medium having

14   computer readable program code means embodied therein for causing generation of a visual

15   representation of a data array of data elements, the computer readable program code means in

16   said article of manufacture comprising computer readable program code means for causing a

17   computer to effect the steps of ~~claim 44~~ claim 40.

18   58. (Original) An article of manufacture comprising a computer usable medium having computer

19   readable program code means embodied therein for causing demonstration of an existence of a

20   watermark in a marked image, the computer readable program code means in said article of

21   manufacture comprising computer readable program code means for causing a computer to effect

22   the steps of claim 43.

23   59. (Original) A computer program product comprising a computer usable medium having

24   computer readable program code means embodied therein for causing detection of a watermark

25   in a marked image, the computer readable program code means in said computer program

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1   product comprising computer readable program code means for causing a computer to effect the

2   steps of claim 44.

3   60.   (Original) An apparatus to impart a watermark onto a digitized image, said apparatus

4   comprising mechanisms for implementing the method of claim 1.

5   61.   (Original) An apparatus for imparting a watermark onto a digitized image comprising

6   mechanisms for implementing the method of claim 5.

7   62.   (previously presented) An apparatus for imparting a watermark onto a digitized image

8   comprising mechanisms for implementing the method of claim 7.

9   63. (Canceled)

10   64. (Canceled)

11   65. (Canceled)

12   66. (Canceled)

13   67. (Canceled)

14   68. (Previously presented) A method as recited in claim 16, wherein the image is a marked

15   image, and the step of aligning includes altering said marked image employing a blurring filter.

16   69. (Previously presented) A method as recited in claim 20, wherein the image is a marked

17   image, and the step of aligning includes altering said marked image employing a blurring filter.

18   70. (Previously presented) A method as recited in claim 30, wherein the image is a marked

19   image, and the step of providing includes altering said marked image employing a blurring filter.

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1   71. (Previously presented) A method as recited in claim 44, wherein the image is a marked

2   image, and the step of aligning includes altering said marked image employing a blurring filter.

3   72. (Previously presented) An article of manufacture as recited in claim 51, wherein the image is

4   a marked image, and the step of aligning includes altering said marked image employing a

5   blurring filter.

6   73. (Previously presented) An article of manufacture as recited in claim 59, wherein the image is

7   a marked image, and the step of aligning includes altering said marked image employing a

8   blurring filter.

9   74. (Previously presented) An apparatus as recited in claim 61, wherein the image is a marked

10   image, and the mechanisms for implementing includes means for altering said marked image

11   employing a blurring filter.

12   75. (Original) A method of generating a visual representation of a data array of data elements

13   having a data array size, said method comprising:

14   providing a visualizer pattern of visualizer pixels represented by a visualizer array of visualizer

15   elements, said visualizer array having a visualizer array size equal to said data array size, wherein

16   each of said visualizer elements has a first logical value if a corresponding visualizer pixel is a

17   first color and a complementary logical value if said corresponding visualizer pixel has a second

18   color;

19   forming a data image of image pixels represented by an image array having an image array size

20   equal to said data array size, wherein an image pixel has a corresponding data element and a

21   corresponding visualizer pixel;

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1 setting said data pixel to a color of said corresponding visualizer pixel if a value of said data

2 element is above a predetermined threshold and to another color if said value is below said

3 predetermined threshold; and

4

5 displaying said data image to form said visual representation.

6 76. (Original) A method as recited in claim 75, wherein said data array represents data resulting

7 from a watermark detection implementation.

8 77. (Original) A method as recited in claim 75, wherein said first color is black and said second

9 color is white.

10 78. (Original) A method as recited in claim 75, wherein said threshold is set at a fifty percent

11 success rate.

12 79. (Original) An article of manufacture comprising a computer usable medium having computer

13 readable program code means embodied therein for causing generation of a visual representation

14 of a data array of data elements, the computer readable program code means in said article of

15 manufacture comprising computer readable program code means for causing a computer to effect

16 the steps of claim 75.

17 80. (Original) A computer program product comprising a computer usable medium having

18 computer readable program code means embodied therein for causing generation of a visual

19 representation of a data array of data elements, the computer readable program code means in

20 said computer program product comprising computer readable program code means for causing a

21 computer to effect the steps of claim 75.

22 81. (canceled)

23 82. (canceled)

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1   83. (Original) An apparatus for detecting a watermark in a marked image comprising
2   mechanisms for implementing the method of claim 15.

3   84. (Original) An apparatus for detecting a watermarking plane comprising mechanisms for
4   implementing the method of claim 16.

5   85. (Original) An apparatus for imparting a watermark onto a digitized image comprising
6   mechanisms for implementing the method of claim 19.

7   86. (Original) An apparatus for detecting a watermark comprising mechanisms for implementing
8   the method of claim 20.

9   87. (Original) An apparatus for detecting a watermark comprising mechanisms for implementing
10   the method of claim 30.

11   88. (Original) An apparatus for demonstrating an existence of a watermark in a marked image
12   comprising mechanisms for implementing the method of claim 43.

13   89. (Original) An apparatus for detecting a watermark comprising mechanisms for implementing
14   the method of claim 44.

15   90. (Original) A method for detecting a watermarking plane comprising the steps of:

16   providing an image having a plurality of image pixels, $u(i,j)$, with said image having I
17   rows and J columns, and a pixel in row i and column j having at least one component, marked by
18   a watermarking plane; said watermarking plane having a plurality of watermarking elements,
19   $w(i,j)$, with said watermarking plane having I rows and J columns, and an element in row i and
20   column j having a brightness multiplying factor;

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1   aligning said watermarking plane with said image;

2   identifying a subset of said image elements; and

3   for each pixel, u(i,j), of said subset of image pixels, employing a detection scheme in
4   determining a probability of watermark detection based on a property of uniform distribution of
5   the random brightness multiplying factors or the random brightness adding or subtracting factors.
6

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